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KING SALMON SPAWNING STOCKS IN CALIFORNIA'S CENTRAL VALLEY, 1961 ¹/₁

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SUMMARY

During 1961, the California Department of Fish and Game conducted its eighth annual king salmon spawning stock assessment in the Sacramento-San Joaquin River system.

Counts of salmon carcasses, live fish, and redds were used as bases for spawning stock estimates. Estimates were primarily for fall-run king salmon.

There were 48,011 salmon examined, including live and dead fish. During 1961, an estimated 259,000 king salmon spawned in the Sacramento-San Joaquin River system. Of these, 256,000 (99 percent) utilized the main Sacramento River and its major tributaries such as the Feather and American rivers.

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INTRODUCTION

This report gives the findings of the eighth annual Central Valley salmon spawning stock assessment conducted by the California Department of Fish and Game during the period September 21, 1961 to January 17, 1962.

METHODS

The 1961 population figures were determined by counting dead salmon, estimating what percentage of the run was counted, and using these factors to compute the total population for each stream or stream section -- the same method used for past assessments. Conditions which would affect these factors such as flow, turbidity, and number of counting trips were considered in making each estimate.

Carcasses recovered were examined for fin marks, tags, sex, and completeness of spawning, then cut in half with a machete to prevent recounting these fish on subsequent trips. Aerial redd counts were used as a basis of population estimates in stream sections where carcasses were not counted.

These estimates are primarily for fall-run fish. Some spring-run salmon are included in estimates for the Upper Sacramento and areas of the Feather River where an overlap in spawning period makes it impractical to make separate counts of fall and spring-run salmon.

Estimates of spring-run salmon in Butte Creek were based on tag-and-recovery data.

Size of salmon stocks in upper Mill Creek was determined by counts of fall and spring-run salmon through a fishway at Clough Dam.

Fall-run salmon in the Mokelumne River were counted at a fishway over Woodbridge Dam.

Salmon taken in a trap at Keswick Dam on the Sacramento River and at Coleman National Fish Hatchery were included in totals, as were fish spawned at Nimbus Hatchery on the American River.

No estimates were made for winter-run salmon.

TABLE 1

FALL-RUN* KING SALMON COUNTS AND POPULATION
ESTIMATES FOR THE MAIN STEM OF THE SACRAMENTO RIVER, 1961

River Section	Number counting trips	Number carcasses & skeletons counted	Estimated spawning population
Keswick Dam Fish Trap			5,481 **
A.C.I.D. Dam to Hwy. 44 Bridge	16	1,272	32,000
Hwy. 44 Bridge to Upper Anderson Bridge	14	1,307	62,000
Upper Anderson Bridge to Ball's Ferry	14	557	19,000
Ball's Ferry to Jelly's Ferry	12	207	16,000
Jelly's Ferry to Iron Canyon	4	13	3,200
Iron Canyon to Red Bank Creek	5	18	2,500
Red Bank Creek to Tehama	7	10	6,500
Tehama to Squaw Hill Bridge	5	5	2,000
Squaw Hill Bridge to Hwy. 32 Bridge	3		600 ***
Hwy. 32 Bridge to Ord Ferry	1		50 ***
Ord Ferry to Colusa	1		250 ***
Total, Sacramento Main Stem		3,389	149,581

* A few spring-run fish were probably included in some of these counts.

** Trap counts.

*** Estimates based on aerial redd counts.

This survey was conducted by 12 men working in two- and three-man crews. Marine Resources Branch provided six men, Region 2 three, Region 4 two, and Region 1, one.

MAIN STEM OF SACRAMENTO RIVER
(Figure 1)

Fall Run

Releases of water below Keswick Dam were stable during the greater part of the spawning period. Resultant low flows and clear water provided predominantly good carcass-recovery conditions except during several heavy rains in mid-season.

There were 3,389 salmon carcasses examined on the main stem Sacramento River between A.C.I.D. Dam and Squaw Hill Bridge (Table 1). There were 5,481 salmon trapped at Keswick Dam and spawned at Coleman Hatchery.

The main stem Sacramento River was used by an estimated 150,000 (149,581) king salmon spawners, including those trapped at Keswick. Between Squaw Hill Bridge and Colusa, the estimate was based on aerial redd counts.

It was calculated from Table 1 that 92 percent of the spawning population in the main stem Sacramento River passed above Iron Canyon to spawn.

Spring Run

No separate estimate was made. A small number of spring-run fish may have been included in the fall count.

TABLE 2

KING SALMON COUNTS AND POPULATION ESTIMATES
FOR SACRAMENTO RIVER TRIBUTARIES - CHICO CREEK, NORTH- 1961

Stream and/or stream section	Number counting trips	Number carcasses & skeletons counted	Estimated spawning population
<u>Battle Creek</u>			
Fall run (Coleman Hatchery)			8,156 *
(below Coleman Hatchery)	12	1,828	11,500
(Gover Ditch)	3	49	200
Fall-run stream total		1,877	19,856
Spring run		<u>Not estimated</u>	
Total, Battle Creek		1,877	19,856
<u>Mill Creek</u>			
Fall run (above Clough Dam)			86 *
(below Clough Dam)	1	51	1,600
(North Fork)			3 *
Fall-run stream total		51	1,689
Spring run (all above Clough Dam)			1,245 *
Total, Mill Creek		51	2,934
<u>Cottonwood Creek</u>			
Fall run	3	203	1,500
Spring run		<u>Not estimated</u>	
Total, Cottonwood Creek		203	1,500
TOTAL, NORTHERN SACRAMENTO TRIBUTARIES		2,131	24,290

• Ladder or trap counts.

SACRAMENTO RIVER TRIBUTARIES - CHICO CREEK, NORTH
(Figure 1)

Battle Creek

Fall Run

The salmon stock in Battle Creek was somewhat smaller than in previous years. Again, as in 1960, more fish spawned below Coleman Hatchery than entered its ponds.

Stream conditions were good for carcass recovery throughout most of the spawning season. There was a short period early in the season when bulldozer work in the channel below the County Bridge caused heavy siltation. However, this factor probably had little effect on total number of carcasses recovered.

There were 1,828 carcasses examined in Battle Creek below Coleman Hatchery (Table 2). The spawning population here was estimated at 11,500 fish. There were 8,156 salmon that entered the holding pond at Coleman Hatchery. About 200 salmon spawned in Gover Ditch. The total salmon stock in Battle Creek, including those taken at Coleman Hatchery and those spawning in Gover Ditch, was an estimated 20,000 (19,856) fish.

Spring Run

No estimate made.

Mill Creek

Fall Run

The fall run of salmon in Mill Creek was larger than runs of the preceding two years.

There were 51 dead salmon counted in the section of Mill Creek below Clough Dam. Based upon both dead and live counts, the run here was estimated as 1,600 fish. (This estimate is based on live fish observations made early in the season.) Most of the fish entered Mill Creek in November.

There were 86 salmon counted through the fishway at Clough Dam during the fall season. These fishway counts are not necessarily indicative of spawning intensity below this dam, where most fish usually spawn.

Only three salmon entered the North Fork of Mill Creek. This relatively small run was probably caused by lack of early rains.

The total fall-run salmon spawning population in Mill Creek was 1,700 (1,686) fish.

Spring Run

All 1,245 spring-run fish were counted above Clough Dam.

Cottonwood Creek

Fall Run

There were 203 carcasses examined in Cottonwood Creek between the mouth and the A.C.I.D. Canal. The spawning population was estimated at 1500 fish.

Spring Run

No estimate was made.

Other Tributaries - Chico Creek, North

Due to non-availability of Regional personnel, surveys made on remaining tributaries in the Upper Sacramento River drainage were inadequate to provide bases for spawning stock estimates.

TABLE 3

KING SALMON COUNTS AND POPULATION ESTIMATES
FOR SACRAMENTO RIVER TRIBUTARIES - BUTTE CREEK, SOUTH - 1961

Stream and/or stream section	Number counting trips	Number carcasses & skeletons counted	Estimated spawning population
<u>Butte Creek (spring run only)</u>			
DeSabra Dam to Paradise Rd. Br.	2	1,199	3,100 **
<u>Feather River</u>			
South Fork (not enough water; presumably no run)			No est.
Middle Fork (mostly fall run)	2		900 ***
West Branch of North Fork			
Spring run	2	0	0
Fall run		Included with North Fork	
North Fork and main stem downstream to Oroville Dam site (mostly fall run)	2		1,100 ***
Main Stream (all fall run)			
Oroville Dam site to Oroville	2		100 ***
Oroville to Sutter Butte Dam	9	226	2,000
Sutter Butte Dam to Gridley	9	3,007	30,000
Gridley to Honcut Creek	9	<u>676</u>	<u>9,600</u>
Total, Feather River		3,909	43,700
<u>Yuba River (all fall run)</u>			
Blue Pt. Mine to Hwy. 20 Br.	8	116	600
Hwy. 20 Bridge to Daguerre Pt. Dam	8	556	3,700
Daguerre Pt. Dam to Baldwin Gravel Pl.	9	<u>925</u>	<u>4,900</u>
Total, Yuba River		1,597	9,200
<u>American River (essentially all fall run)</u>			
Nimbus Hatchery			14,309 *
Nimbus Dam to hatchery racks		1,000	1,100
Racks to Del Paso Gravel Plant	13	<u>5,043</u>	<u>10,100</u>
Total, American River		6,043	25,509
TOTAL, SOUTHERN SACRAMENTO TRIBUTARIES		<u>12,748</u>	<u>81,509</u>

* Ladder counts.

** Based on tag and recovery data.

*** Based on aerial redd counts.

SACRAMENTO RIVER TRIBUTARIES - BUTTE CREEK, SOUTH
(Figure 2)

Butte Creek

Fall Run

One aerial survey was made to locate fall-run salmon in Butte Creek. None were observed.

Spring Run

This year's spawning population estimate again was based on a tag and recovery study. Although flow releases from the Centerville Powerhouse were the same as last year, turbid water resulted in less favorable carcass recovery conditions. There were 1199 carcasses counted during two trips between DeSabra Dam and Paradise Highway.

Several hundred salmon were attracted into the canyon area above Centerville Powerhouse by a flow of 112 c.f.s. that was released into Butte Creek from DeSabra for two weeks during mid-September. They were trapped there when the flow was reduced to 2 c.f.s. Of the carcasses examined in this section, 42 percent were unspawned or only partly spent.

The population of spring-run king salmon in Butte Creek was an estimated 3,100 (3,082) fish, based on tag and recapture data. This includes the several hundred fish mentioned above which were largely unsuccessful in spawning because of low flows.

Feather River

South Fork

Fall run and spring run: No estimates; flows again were too low and temperatures too warm to maintain salmon. Presumably no spring or fall run.

Middle Fork

Fall run and spring run: The spawning stock of spring and fall-run salmon in the Middle Fork, estimated from aerial redd counts, was 900. Again, most of these were fall run.

West Branch of the North Fork

Spring run: Two survey trips were made between Yankee Hill Bridge and the mouth to locate salmon. No fish or redds were observed. Flows were very low.

Fall run: Small run - included with North Fork run.

North Fork and main stem downstream to Oroville Dam site

Fall run and spring run: The spawning population was about one-half as large as last year's. Based on aerial survey, the spawning stock of both spring and fall-run salmon was an estimated 1,100 fish. Most of these were fall run.

Main Stream - Oroville Dam site to Oroville

Fall run: Based on aerial redd counts, the spawning stock for this section was 100 fall-run fish.

Spring run: Few, if any, in this area.

Main Stream - Oroville to Honcut Creek

Fall run: This year's stock of fall-run salmon was approximately 50 percent as large as last year's. Recovery conditions were adverse due to high, turbid water during peak spawning period.

There were 3,909 dead salmon examined during the season. Survey crews made nine counting trips in each of three sections. The greatest amount of spawning occurred between Sutter Butte Dam and Gridley.

Spring run: Spring-run fish do not spawn this far downstream.

Total fall and spring run, Feather River system: The stock of both fall and spring-run salmon in the entire Feather River drainage was estimated at 43,700 fish.

Yuba River

Fall Run

Stream conditions were very good for carcass recovery throughout the spawning period. Stream flows were low and water was clear.

There were 1,597 dead salmon examined in eight trips in the upper two sections, and nine trips in the lower section. Several long, deep pools were surveyed by a diver to determine the percentage of carcasses missed by the regular survey crew. An insignificant number of dead salmon was observed.

The spawning population was an estimated 9,200 fish. This is approximately 50 percent as large as last year's stock.

A greater utilization of spawning gravels between Daguerre Point Dam and the Baldwin Gravel Plant occurred this year. This was the result of negotiations with the Water District for maintenance of adequate spawning flows.

Stranding and loss of salmon which has occurred in past years through release and subsequent cutback of large flows was averted this year by installation of a wire barrier above Highway 99 bridge. This prevented fish from moving upstream the first week in September through the middle of October.

Spring Run

No remaining spring run in the Yuba River.

American River

Fall Run

Conditions for carcass recovery were exceptionally favorable throughout the spawning season. River flows remained low (approximately 500 c.f.s.) and stable. Water clarity was excellent. Carcasses and skeletons were clearly visible on the bottoms of deep holes. The survey crew recovered 5,043 dead salmon below Nimbus racks in thirteen counting trips. This was the greatest number of carcasses examined below Nimbus racks since these surveys began. Because of the large number of trips made under ideal recovery conditions, it was estimated that the recovery was about 50 percent.

There were an additional 1,000 carcasses recovered between Nimbus Dam and the hatchery racks. There were 14,309 salmon that entered Nimbus Hatchery. This includes 1,619 grilse.

The fall-run spawning stock below the hatchery racks was estimated at 10,100 salmon. The number of fish between the dam and racks was an estimated 1,100. A total of 25,509 king salmon were estimated to have spawned in the American River, including the 14,309 fish that entered the hatchery.

King salmon eggs taken this year exceeded the hatchery's capacity. Surplus eggs were planted in the gravels of several Central Valley streams during the winter of 1961-62. Over two-million eyed eggs were planted in the American River.

Spring Run

The few remaining spring-run fish were included with the fall run.

TABLE 4

FALL-RUN* KING SALMON COUNTS AND POPULATION ESTIMATES
FOR SAN JOAQUIN RIVER TRIBUTARIES, 1961

Stream and/or stream section	Number counting trips	Number carcasses & skeletons counted	Estimated spawning population
<u>Cosumnes River</u>			
Michigan Bar to Sloughhouse	1	0	No est.
<u>Mokelumne River</u>			137 **
<u>Stanislaus River</u>			
Goodwin Dam to Knights Ferry	3	1	20
Knights Ferry to Orange Blossom Br.	5	98	550
Orange Blossom Br. to Oakdale	5	47	300
Oakdale to Riverbank	5	<u>82</u>	<u>1,030</u>
Total, Stanislaus River		228	1,900
<u>Tuolumne River</u>			
La Grange to Rairden's Farm	5	6	25
Rairden's to Roberts Ferry Bridge	5	21	75
Roberts Ferry to Reed Rock Plant	5	<u>69</u>	<u>400</u>
Total, Tuolumne River		96	500
<u>Merced River</u>			
Snelling Bridge to McSwain Bridge	3	<u>2</u>	<u>50</u>
TOTAL, SAN JOAQUIN TRIBUTARIES		463	2,587

* No spring run remains in any of the San Joaquin tributaries, except possibly the Merced River where no estimate was made this season.

** Ladder counts.

SAN JOAQUIN RIVER SYSTEM
(Figure 3)

Cosumnes River

Fall Run

The lower Cosumnes River was dry until the late winter rains. Only one salmon was observed during the single survey trip made after access for fish became possible. No spawning population estimate was made for this stream.

More than one-million eyed salmon eggs from Nimbus Hatchery were planted.

Spring Run

None.

Mokelumne River

Fall Run

The annual count of salmon was made at a fishway at Woodbridge Dam during October 6, 1961, through December 24, 1961. A total of 137 king salmon was counted (Table 4). This is one of the lowest counts ever recorded here.

More than five-million eyed salmon eggs from Nimbus were planted.

Spring Run

None.

Stanislaus River

Fall Run

Flows during most of this year's spawning period were low (35 - 40 c.f.s.) and precluded migration of adults until occurrence of winter rains. Except for siltation from gravel plant operations below Oakdale, water clarity was very good throughout the season.

Five counting trips were made on three lower sections of the Stanislaus River and three trips on the one upper section. A total of 228 carcasses was examined. The spawning stock was an estimated 1,900 king salmon -- the smallest stock on record.

Spring Run

None.

Tuolumne River

Fall Run

The 1961 fall run of king salmon in the Tuolumne River was the smallest ever recorded for this river. Survey crews examined 96 carcasses during five counting trips. The spawning stock was estimated at 500 fish. It accommodated 45,000 salmon in 1960 and as many as 130,000 salmon in the past.

Extremely low water flows, high water temperatures, encroachment of emergent and submergent vegetation on spawning riffles, poaching, pollution, and beaver dams have caused the decline of this stock. Similar conditions exist on the Stanislaus and Merced rivers.

Spring run

None.

Merced River

Fall Run

Low flows again precluded entry of fish into the Merced River during most of the season. Rainfall during the first week of December increased flows sufficiently to permit adults to migrant upstream.

Siltation from gravel company operations resulted in poor recovery conditions. Only two carcasses were recovered by the survey crew during three counting trips.

The spawning stock was an estimated 50 fish. This is based on carcass recovery and other factors.

Spring Run

No estimate.

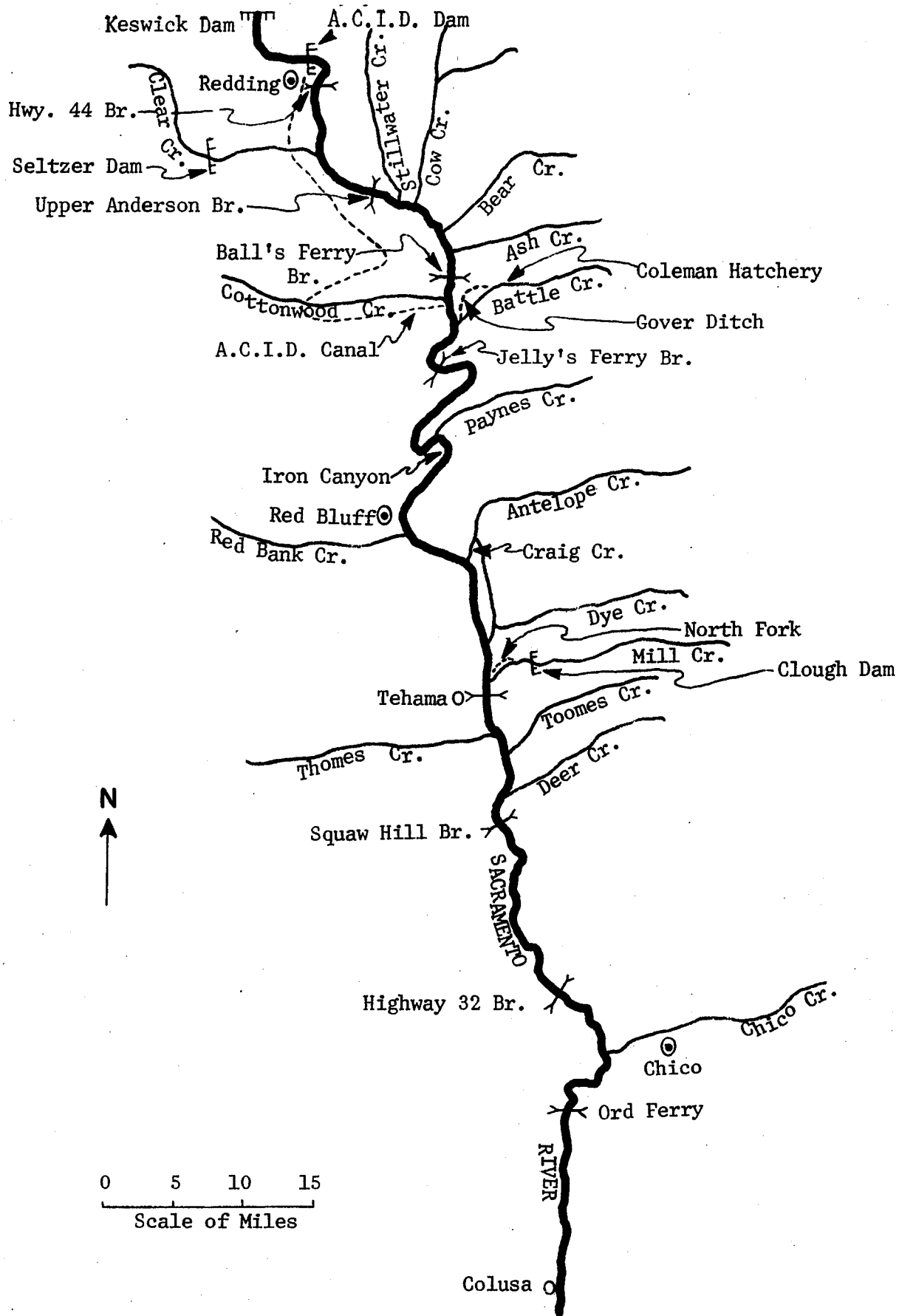


Figure 1. Upper Sacramento River and Tributaries above Butte Creek covered during the 1961 King Salmon Spawning Survey.

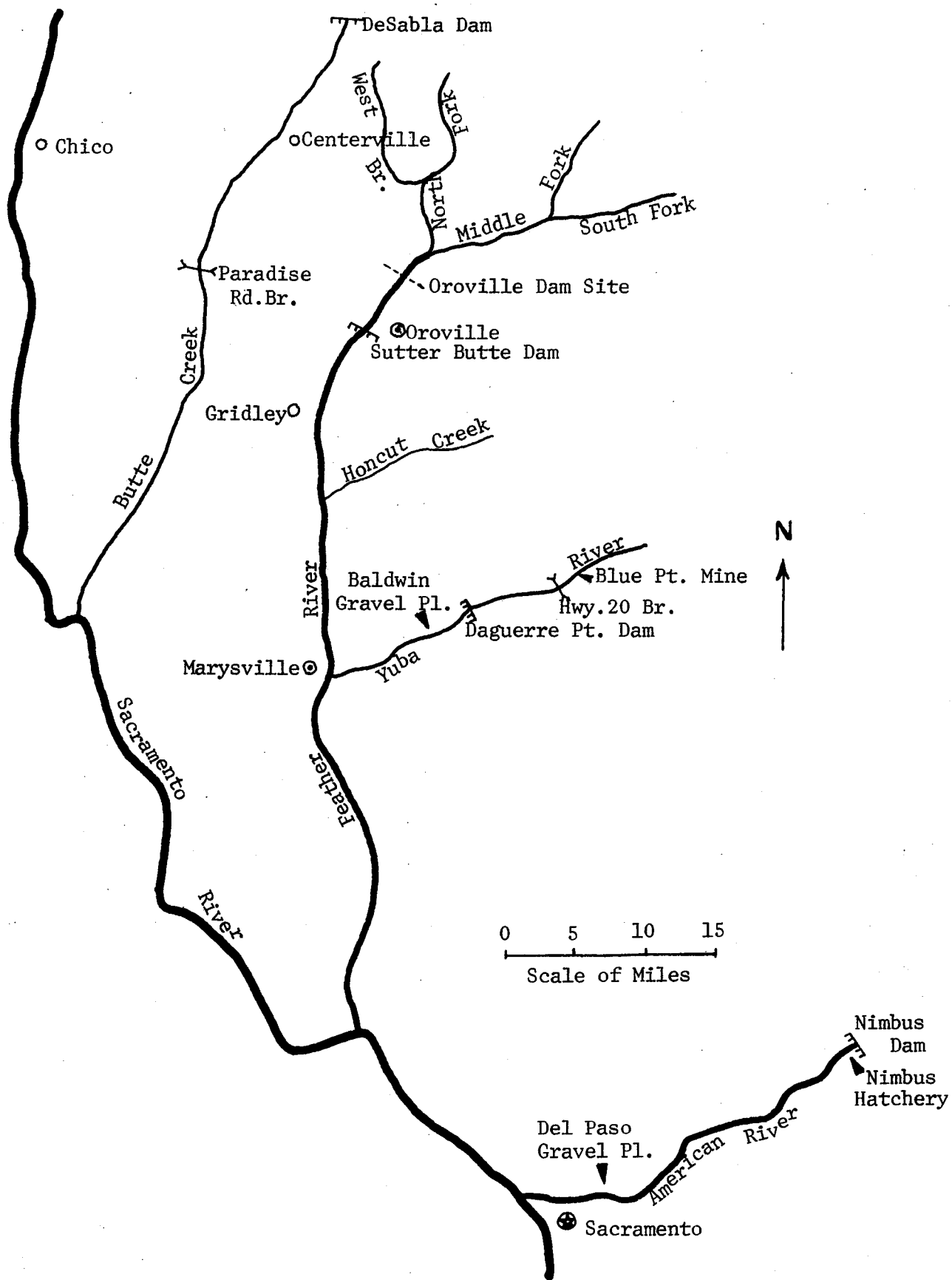


Figure 2. Sacramento River Tributaries south of Chico Creek covered during the 1961 Spawning Area Survey.

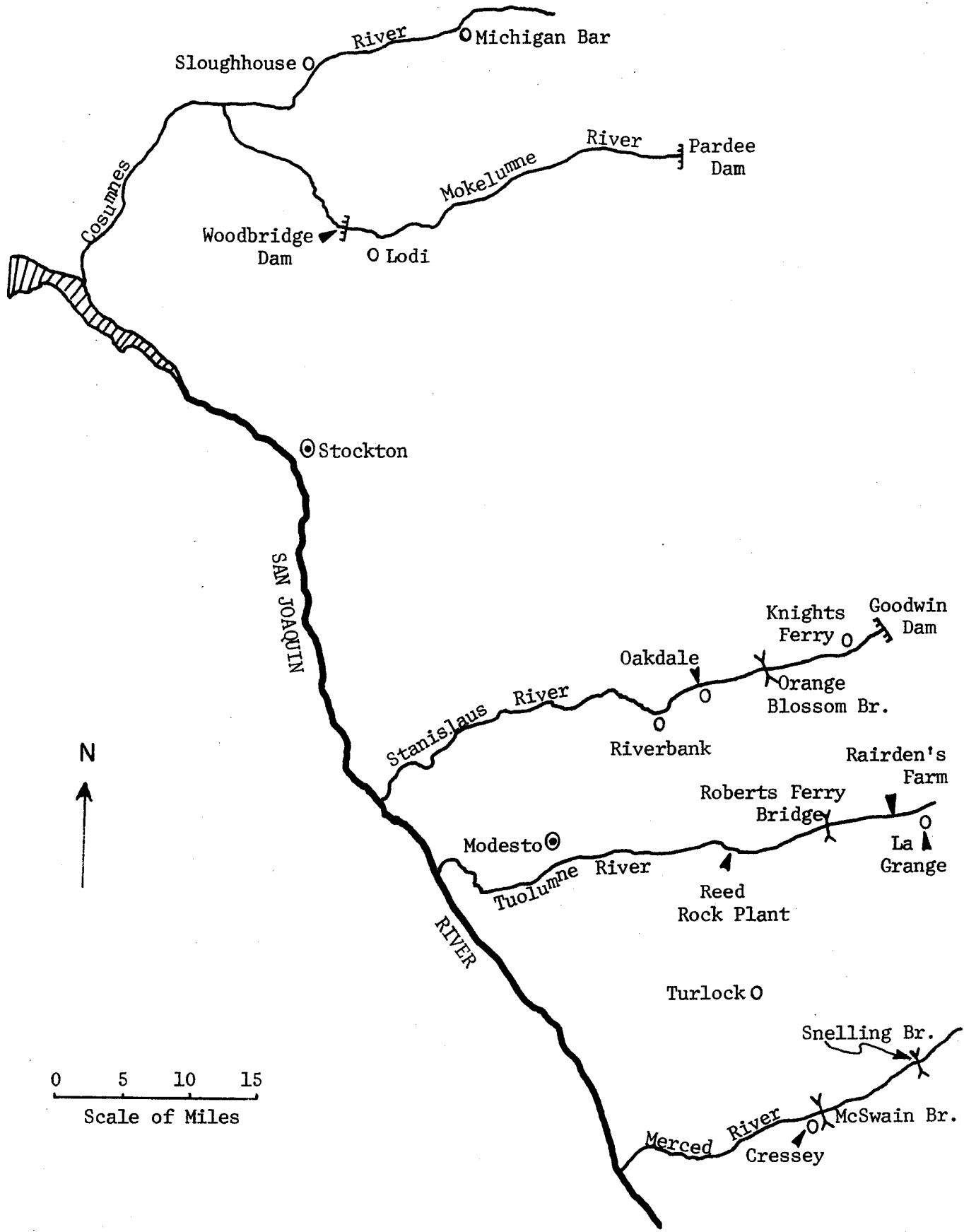


Figure 3. San Joaquin River Tributaries covered during 1961 Spawning Area Survey.